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In-Situ Conservation of Soil and Water Through Farm Pond Technology-A Case Study in K. Shankaranahalli Village Arasikere Taluk, Karnataka

Sreenivasa[1]
Block Programme Officer Ex-Employee Of Baif Institute For Rural Development-Tiptur, Karnataka, India.

***ABSTRACT**: Investigations were carried out from 2003-2005 at K.Shankaranahalli village to evaluate farm pond technology and its advantages. The experiment was laid out in catchment area. Natural resources are the main sources of the life supporting system in rural areas. Both humans and livestock sustain on this resource base, which is rapidly degraded because of growing population pressure and over exploitation CPR'S such as grazing lands and water bodies are avenues 0of income and livelihood for poor people in the villages. But demographic pressure is also taking a heavy toll on the CPR'S affecting the livelihoods of the poor. In addition to the declining quality of natural resources in CPRs and private property resources, the evolving socio economic and demographic patterns in the rural areas are negatively influencing the ability of poor to access natural resources against this back ground, the project enabling rural poor for better livelihoods through improved NR'S management in semi arid area. Was sponsored by NRSP of the UK DFID. CRIDA, NARS, ICRISAT AND BIRD-K led the project. The project was officially inaugurated in May 2003 and closed in March 2005.severe degradation of marginal and forest leads has occurred in the last four decades because of population pressure. Acute scarcity of drinking water, fodder, fuel is faced frequently Arasikere in Karnataka is part of the central dry zone of Karnataka and has dual mode of rain fall distribution. Soils are mostly sandy loam with high slopes and high erosion rates. Because of the high altitude the cropping pattern is distinct. Orchards of coconut are a major economic activity in the district. significant proportion of families in most of the villages are BPL .Farmers report that the ground waters is over exploited resulting in lowering of the water table and drying of open wells. Crop cultivation in most of the area is restricted to a single season i.e. rainy season. In view of the above situation, proper harvesting of rain water received during the monsoon and storing it to utilize later is one way to improve livelihoods.Insitu conservation of the rainfall and moisture would also help crop growth and productivity. Accordingly farm ponds were offered by farmers in K.Shankaranahalli during PRA program me.*

***KEY WORDS**: Agriculture, Arid Regionconservation, Bpl, Dfid, Farm Pond, Ngo, Pra, Storage.*

I. INTRODUCTION

The vast majority of the poor farmers live in parts of the country where rainfall is limited. Often large amounts of rainfall are received but in a very short span of time, leaving the rest of the year dry. Reduced rain fall or prolonged dry spells often lead to crop failure. Poor land less laborers and small farmers struggling to cultivate crops and raise livestock are further pushed in to poverty by irregular rainfall, recurrent drought and soil degradation, and are often forced to migrate to urban centers in search of employment. Depleted ground water and the high costs of irrigation infrastructure are major handicaps. Alternative solutions are needed to increase the quantity of water for farmers' fields, Solutions that are affordable effective eco-friendly and beneficial for the poor. There are many types of water harvesting structures. At the house hold level, one of the most effective systems is the farm pond. A Farm pond is a dug out pond constructed in or near the farm. A farm pond is a large hole dug out in the earth usually square or rectangular in shape which harvests rain water and stores it for future use. It has an inlet to regular in flow and out let to discharge excess water. The pond is surrounded by a small bund which prevents erosion on the banks of the pond. The size and depth depends on the amount of land available, the type of soil the farmer's water requirements the cost of excavation and the possible uses of the excavated earth. Rain water is collected in the pond and stored for future uses such as irrigation crops recharging ground water and providing drinking water for farm livestock in addition farm ponds save women and children from walking for miles to find collect and carry water for domestic use, farm ponds can also provide an additional source of income for families by supporting activities like fish rearing and growing vegetables, fodder and oil yielding medicinal plants and flowering plants.

II. OBJECTIVES OF THE STUDY:

1).To work out the economics of farm ponds
2).To work out the eco-friendly practices in comparison with conventional practices
3).To study the effect of farm pond technology
4).To study the perception of the inhabitants
5).To studies the impact on ground water level.

III. MATERIALS AND METHOS

2.1. STUDY AREA: Field experiments were conducted from 2003 to2005 at K.Shankaranahalli village 100kms away from district head quarters of Hassan, 40kms away from the Arasikere taluk The Study area comes under Hassan District Covering an area of 711 ha's of catchment area the location of Catchment area is shown in Figure. K.Shankaranahalli village has a Total Geographical Area of 711 ha. The annual Rain fall varies from 600-650mm. the monsoon commences in May and ends in December with the peak rainfall period between September and October. The area has experiencing continuous drought for the last 3 years. In up lands soil erosion, poor fertility, ground water depletion, lack of vegetation and gully formation problems. Most of the rain water runs off unchecked in the watershed area.

2.2.LOCATION: Selection of farm pond site for a farm pond is critical in maximizing its storage capacity the pond must be excavated in a corner of a plot of land .So that it does not disturb farm operation like plowing. it must be located at least 3m away from other farmers fields common lands. The slope of the land and the slop's direction must also be carefully evaluated.

2.3. EXCAVATION:

The excavation and transportation of earth can be accomplished with a combination of manual lab our or machines like excavators and tractors.

2.4. TRENCH CUM BUNDS:

According to the farmer's natural resources development preferences, T/B is a second choice after planting forestry seedlings. Traditionally farmers follow the practice of opening trenches in coconut gardens for safe disposal of water from fields. Trench cum bunds has been implemented in 105 ha of land in 2003. The beneficiaries contributed 30% share of the total cost in the form of lab our. The typical trenches are 5m long 1m wide 0.3m deep respectively with a storage capacity of $1.5m^3$(1500liters).depending on the soil condition a laborer can dig 4-5 trenches per day both the trench and bunds are utilized for plantation of forestry seedlings fodder with good survival and establishment.

2.5. FARM PONDS:

Before the introduction of farm ponds the people were not aware of the concept of digging ponds specially for water harvesting. They were familiar with water collection pits, since in this village many small Dugout pits were seen in the Farmer fields. The soil from the pits was used for coconut plantation to improve the soil fertility and the dugout pits then acted as water storage structures. Normally the Dugout pits are 1 to 3 m deep with varying volume (3to 5 m^3) Farmers came to know about the concept of farm ponds and their role in rain water harvesting and recharging of ground water through the earlier work of the NGO project partner BIRD-K which had already made considerable impact in neighboring villages.

So farmers readily accepted the concept of from ponds after field visits and Interaction with the beneficiaries of the neighboring villages Forty five Farm ponds were dug with partly contribution from the farmers. The SS members in consultation with BIRD-K officers selected the site for excavation of farm ponds. For every 2ha area one farm pond was proposed in lands having 2-3 % slope. When dug out manually, the side slopes were cut in to slopes around the pond boundaries the capacity of the ponds varied depending on the size and location of the farmers plot. On an average the ponds were of 10m long 10m wide and 3m deep with 1:1 side slope. This means creating water storage of 1, 62,000 liters. The dugout soil was used to build a mound of 1-1.5m high around the pond to protect the pond and act as well around it. Protective grasses forest tree species and vegetables were planted on the mounds. Each pond has inlet and out let channels. The inlet channel has a silt trap and stone pitching was done to protect the inlet from erosion. Due to the farm ponds the ground water level improved considerably. Informal agreements in the community allowed some of the stored farm pond water to be seen as a common property in terms of drinking water for livestock. The community agreed this in recognition of the pond being constructed with project resources.

2.6. INLET AND OUTLET CHANNELS:

Each pond has inlet and outlet channels the inlet channel has a silt trap and stone pitching was done to protect the inlet from erosion. Size of the silt trap is about 1m length 1m wide and 1m deep.

2.7. DIVERSION CHANNEL: The typical trenches are 5m length 1m width and 0.3m deep are excavated and diverting in to farm ponds.

2.8. VEGETATIVE CHECKS: Protective grasses, forest trees, and vegetables were planted on the mounds.

IV. INDENTATIONS AND EQUATIONS

The dimensions of the farm ponds are designed based on the area

Total catchment area (land holding) area = 2.0 ha
Effective rain fall received =600m =0.6m
Total volume of rain fall received =2x10000x0.6m
From 2 ha's =12000 cu. M
Expected run off in to farm pond =40% of effective rainfall or8000x40/100
=0.4x12000=4800 cu m
No. of expected fillings = 2
Storage volume required in farm pond=4800/2=2400cu m
Depth of farm pond proposed =3m
Mean area of pond will be 2400/3=800 sq m
Mean length =10m
Mean bread =10m
Side slope of the pond = 1:1
Top length of farm pond =10=3=13m
Top breadth of farm pond =10=3=13m
Bottom length of farm pond =10-3=7m
Bottom breadth of pond =10-3=7m
Land area that will be lost for cultivation =13x13 =169m^2 or 0.845m^2
Net cultivable area =2x10000-169
=19831 sq m
Net storage available in pond after allowing for evaporation =2400x75/100
Losses at 25 % of storage =1800 cu m per filling
Net storage available in farm pond after allowing for evaporation =1800x2
=3600 cu m
3600x45 no .of ponds excavated=162000 cu m
162000x100=16200000 liters

V. FIGURES AND TABLES

Fig.1. Pra Meeting In Shankaranahalli Village

Fig.2. Villagers Actively Participated Inpra Maping

Fig.3.Farm Pond With Rain Water Harest In K.Shankaranahalli Village

Table.1. Infrastructures Are Services Facilities Available In K.Shankaranahalli Village.

PARTICULARS	K.SHANKARANAHALLI
PRIMARY SCHOOL (NO)	1
HIGH SCHOOL	1
POST OFFICE	-
GRAMA PANCHAYAT	1
OFFICE	-
VETERNARY CLINIC	-
HOSPITAL	1
ANGANAVADI	1
MILK COLLECTION CENTER	5
SHG	

TABLE.2. EXISTING AGRO-CLIMATIC SITUATIONS IN K. SHANKARANAHALLI

PARTICULARS	SHANKARANAHALLI
LAND USE TOTA AREA (ha) FOREST AREA (ha) FALLOWS AND WASTE LANDS(ha) NET CULTIVATED AREA (ha)	 NA Nil 272 517
MAJOR CROPS: KHARIF SEASON RABI SEASON	 Finger millet, sorghum, ground nut castor, coconut paddy mango. sorghum

TABLE.3. Socio-Economic and Demographic Profile of the Village

PARAMETERS	SHANKARANAHALLI
POPULATION	835
MALE	285(49%)
FEMALE	295(51)
NO.OF.FAMILIES	235
NO.OF.SC FAMILIES	54(23%)
NO.OFST.FAMILIES	6(3%)
LITERATURE	72.5
FARM HOUSE	68
SMALL	66
MINIMUM	66
LARGE	66
Very large	33
LANDLESS FAMILIES	-
WAGE EMPLOYMENT	20
SELF EMPLOYMENT	79
SERVICES:GOVT/PRIVA	44
WEALTH RANKING:	
RICH	26
MIDDLE	130
BPL	79

TABLE.4.Composition Of Salaha Samithi In K.Shankaranahalli Village

V. DISCUSSION AND COCLUSSION

Field experiments were conducted from 2003 to2005 at K.Shankaranahalli village 100kms away from district head quarters of Hassan, 40kms away from the Arasikere taluk The Study area comes under Hassan

Sl. No	Name	sex		Age	Caste (ST/SC/OBC)	**Present Position in Village Institution**	Village
		male	Female				
1	SR.MARULAPPA	M		57	OBC	**President**	S.K Halli
2	SH. VISHWANATHAPPA	M		57	OBC	**Vice President**	S.K Halli
3	SM GURUMARULA SIDDAPPA	M		43	OBC	**Secretary**	S.K Halli
4	SV.MALLIKARJUNA	M		48	OBC	**Member**	S.K Halli
5	SM JAY NANDA MURTHY	M		43	OBC	**Member**	S.K Halli
6	MRUTUNJAYAPPA	M		57	OBC	**Member**	H.M Kaval
7	MAYASHETTY	M		58	OBC	**Member**	S.K Halli
8	GOVINDANAIK	M		40	SC	**Member**	S.K Halli
9	HALAPPA	M		50	OBC	**Member**	S.K Halli
10	MARULASIDDANAIKA	M		45	ST	**SHG Members**	S.K Halli
11	SS BASAVARAJ	M		38	OBC	**SHG Members**	S.K Halli
12	SB.BASAVARAJ	M		43	OBC	**SHG Members**	S.K Halli
13	SHASIDHARA	M		30	OBC	**SHG Members**	S.K Halli
14	SC.MALLIKARJUNA	M		30	OBC	**SHG Members**	S.K Halli
15	SC.MARULASIDDAPPA	M		30	OBC	**SHG Members**	H.M Kaval
16	GANESHAPPA	M		50	OBC	**SHG Members**	H.M Kaval
17	Susheelamma		F	33	OBC	**SHG Members**	S.K Halli
18	Leelavathi		F	23	OBC	**SHG Members**	S.K Halli
19	Maheswaramma		F	40	OBC	**Member**	S.K Halli

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VI. RECOMMENDATIONS:

- Provision of inlet and out let channels is a must for the farm ponds
- There should be a silt trap chamber in the inlet channel to capture and the silt before the rain water gets in to the farm pond.
- The top 30cm depth of the soil may be used for enriching the land around the pond.
- To prevent the erosion of the bunds around the ponds suitable vegetation cover should be
- Raised such as stylanthas hemata, grass.
- Farm pond based watershed development needs to be promoted
- Large scale private investment is need farm pond
- Farm pond is used as multipurpose livelihood source for small and marginal farmers.
- The design for stored Farm ponds must be made after calculating crop water
- Depending on the type of soil slopes should be designed when excavation is made for the
- Farm ponds with a minimum of 1:1 slope to prevent caving in the soil.
- Financial resource required for the construction of the farm ponds should be raised by approaching government for grant banks for loan to farmers.

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